Phys 4406	ADVANCED SOLID STATE PHYSICS	(CR3)
Preq.	Phys 3402/ ADP (Physics)	

Objectives

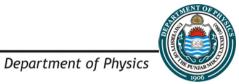
This course will provide an introduction to magnetic phenomena in solids.

Syllabus

Ferromagnetism and Antiferromagnetism: Ferromagnetic order, Curie point and the exchange integral, temperature dependence of the saturation magnetization, saturation magnetization at absolute zero, magnons, ferromagnetic magnons, quantization of spin waves, thermal excitation of magnons, neutron magnetic scattering, ferromagnetic order, Curie temperature and susceptibility of ferrimagnets, antiferromagnetic order, susceptibility below Neel temperature, antiferromagnetic magnons, ferromagnetic domains, anisotropy energies, transition region between magnetic domains, origin of domains, hysteresis curve, single domain particles, superparamagnetism, magnetic force microscopy. Magnetic resonance: Magnetic resonance phenomenon's in magnetism, nuclear magnetic resonance (NMR), equations of motion, line width, motional narrowing, hyperfine splitting, nuclear quadrupole resonance, ferromagnetic resonance (FMR), shape effects in FMR, spin wave resonance,

Curriculum (2020), Physics Degree Programs, University of the Punjab, Lahore

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antiferromagnetic resonance, electron paramagnetic resonance, exchange narrowing, zero-field splitting.

Recommended Books

- 1. Introduction to Solid State Physics by C. Kittle, 8th Edition (2012).
- 2. Magnetic Materials: Fundamentals and Applications by N. A. Spaldin, 2nd Ed. (2011).
- 3. Quantum Theory of the Solid State by J. Callaway, 2nd Edition (1991).
- 4. Introduction to Magnetic Materials by B. D. Cullity & C.D. Graham, 2nd Ed. (2008).